R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

THE SPECIFICATION

The specification has been amended at page 34, line 18 to indicate that the top gate driver 11 corresponds to the "means for applying a negative voltage" recited in claims 8 and 10 of the present invention. In addition, the specification has been amended at pages 53 and 67 to correctly indicate that information relating to a wavelength of 520 nm (not 530 nm) is shown in Figs. 13B and 13C, so as to better accord with the disclosure in Figs. 13B and 13C and the disclosure in the specification at, for example, page 51, line 20. Still further, the specification has been amended to correct some additional minor informalities of which the undersigned has become aware.

No new matter has been added, and it is respectfully requested that the amendments to the specification be approved and entered.

THE CLAIMS

Claims 1 and 5 have been amended to recite that the exciting light absorbing layer selectively absorbs exciting light and selectively transmits fluorescent light which is emitted from a

fluorescent substance excited by the exciting light, as supported by the disclosure in the specification at, for example, page 51, lines 12-20.

In addition, claims 8 and 10 have been amended to recite that a positive voltage is applied to the transparent conductive layer to attract a nucleotide strand, as supported by the disclosure in the specification at, for example, page 30, lines 17-18 and page 80, lines 18-22. Claims 8 and 10, moreover, have been amended to recite means for applying negative voltage to each of the light-transmissive top gate electrodes in a charge storage period, so as to overcome the rejection under 35 USC 112, second paragraph. And claims 8 and 10 have been amended to delete the recitation of means for applying one of a positive voltage and a ground potential to the transparent conductive layer.

Still further, new claim 22 has been added to recite that the exciting light absorbing layer includes titanium oxide, as supported by the disclosure in the specification at, for example, page 48, lines 9-12.

New claim 23 has been added to recite that the exciting light absorbing layer is classified into one of anatase-type and rutile-type, as supported by the disclosure in the specification at, for example, page 51, lines 5-7.

New claim 24 has been added to recite that, in the exciting light absorbing layer, transmissivity of light having a wavelength of 308 nm is 1.0×10^{-3} times or less than transmissivity of light having a wavelength of 520 nm, as supported by the disclosure in, for example, Fig. 13B and the disclosure in the specification at page 51, lines 12-20, and page 53, lines 5-15.

And new claim 25 has been added to recite that the thickness of the exciting light absorbing layer is at least 100 nm, as supported by the disclosure in the specification at, for example, page 53, lines 12-13.

With respect to the rejections under 35 USC 112, first and sixth paragraphs, moreover, it is respectfully pointed out that the top gate driver 11 shown in Fig. 5 and described in the specification at page 34, lines 16-23 corresponds to the means for applying the negative voltage recited in claims 8 and 10.

No new matter has been added, and it is respectfully requested that the amendments be approved and entered, and that the rejections under 35 USC 112, first, second and sixth paragraphs, be withdrawn.

THE PRIOR ART REJECTION

Claims 1, 5, 8, 10-13, 17, 20-21 were rejected under 35 USC 103 as being obvious in view of the combination of USP 5,846,708

("Hollis et al"), US 2002/0014530 [1] ("Iihama") and USP 6,465,724 ("Garvison et al"). In addition, claims 4 and 18-19 were rejected under 35 USC 103 as being over Hollis et al, Iihama and Garvison et al, and further in view of USP 5,381,028 ("Iwasa"). These rejections, however, are respectfully traversed with respect to the claims as amended hereinabove.

Re: claims 1 and 5

Significantly, according to the present invention as recited in amended independent claims 1 and 5, the exciting light absorbing layer selectively absorbs exciting light and selectively transmits fluorescent light which is emitted from a fluorescent substance excited by the exciting light, and the conductive layer discharges charges caused by electron-hole pairs generated by the absorbed exciting light in the exciting light absorbing layer.

With the structure of the present invention as recited in each of amended independent claims 1 and 5, not only does the exciting light absorbing layer prevents exciting light from entering to the photoelectric elements by absorbing the exciting light, but also the conductive layer discharges the electric

[1] The Examiner incorrectly cites US 2003/90014530 as the Patent Application Publication Number for Iihama. However, Iihama (US 2002/0014530) is correctly listed on the Notice of References Cited (PTO-892) by the Examiner.

charge generated by absorbing the exciting light. Thus, with the structure of the present invention as recited in amended independent claims 1 and 5, an advantageous effect is produced whereby the negative effect of the electric charge on the photoelectric elements is successfully prevented.

It is respectfully submitted that none of the cited prior art references disclose, teach or suggest the above described structural features and advantageous effect of the exciting light absorbing layer and the conductive layer of the present invention as recited in amended independent claims 1 and 5.

In item 13 of the Office Action, the Examiner acknowledges that Hollis et al does not explicitly teach an exciting light absorbing layer and a conductive layer. For this reason, the Examiner has cited the combination of Iihama and Garvison et al.

However, Garvison et al merely discloses that amorphous silicon absorbs UV light and visible light (see column 14, line 66 to column 15, line 1.)

With respect to Iihama, the Examiner asserts that the impact alleviating layer 27 of this reference, which is made of amorphous silicon and which alleviates an impact of contacting electrostatically charged fingers, corresponds to the exciting light absorbing layer of the present invention (see Fig. 25 and paragraphs [0111]-[0113] of Iihama.) However, it is respectfully submitted that it would be obvious to one of ordinary skill in

the art that (and as disclosed in paragraph [0113] of Iihama that) the impact alleviating layer 27 must have high resistance of about 10^6 to 10^8 Ω to carry out its function.

Therefore, even if Garvison et al were combinable with Iihama in the manner suggested by the Examiner, it is respectfully submitted that such a combination would not achieve or render obvious an amorphous silicon layer which selectively absorbs exciting light and transmits fluorescent light of a fluorescent substance excited by the exciting light as according to the claimed present invention.

More generally, the image reading apparatus of Iihama which includes the impact alleviating layer 27 is merely a finger print sensor. That is, Iihama does not at all disclose, teach or suggest that the image reading apparatus thereof is an optical DNA sensor or any other device which is irradiated with UV light. Therefore, it is respectfully submitted that the impact alleviating layer 27 of Iihama, which is for alleviating the shock of release of static electricity from a finger, does not at all correspond to the exciting light absorbing layer of the claimed present invention, which is for absorbing exciting light and transmitting fluorescent light.

Still further, it is noted that the indium tin oxide conductive layer 23 of Iihama is merely provided in the image reading apparatus thereof to discharge the static charge of

fingers. Therefore, it is respectfully submitted that Iihama does not disclose, teach or suggest the conductive layer as according to the present invention as recited in claims 1 and 5 whereby the conductive layer discharges charges caused by electron-hole pairs generated by the absorbed exciting light in the exciting light absorbing layer.

Clearly, Iihama (even if considered in combination with Garvison et al) is not related to an image reading apparatus which is irradiated with exciting light and nor does the combination produce the advantageous effect of successfully preventing the negative effect of the electric charge (caused by the absorbed exciting light) on the photoelectric elements as according to the structure of the present invention as recited in claims 1 and 5.

Therefore, it is respectfully submitted that even if all of Iihama, Garvison et al and Hollis et al were combinable in the manner suggested by the Examiner, any such combination would still not achieve or render obvious the structure of the present invention as recited in claims 1 and 5 whereby the exciting light absorbing layer selectively absorbs exciting light and selectively transmits fluorescent light which is emitted from a fluorescent substance excited by the exciting light, and whereby the conductive layer discharges charges caused by electron-hole

pairs generated by the absorbed exciting light in the exciting light absorbing layer.

Re: claims 8 and 10

According to the present invention as recited in amended independent claims 8 and 10, moreover, a plurality of photoelectric elements are arranged apart from each other on a surface of the transparent substrate, each of which includes a bottom gate electrode having a shading property, a semiconductor layer having a light sensitivity, and a light-transmissive top gate electrode, wherein the bottom gate electrode, the semiconductor layer and the light-transmissive top gate electrode are layered in order on the transparent substrate. In addition, as recited in claims 8 and 10, the optical DNA sensor of the present invention comprises means for applying negative voltage to each of the light-transmissive top gate electrodes in a charge storage period, and a transparent conductive layer which is provided in the solid imaging device between the DNA probes and the plurality of photoelectric elements, and to which a positive voltage is applied to attract a nucleotide strand.

With the structure of the present invention as recited in amended independent claims 8 and 10, the transparent conductive layer is charged by a positive voltage so that the negative effect of the top gate electrode to nucleotide strands is

canceled out. As a result, an advantageous effect is produced whereby electrostatic repulsion of nucleotide strands leading to blocking out of hybridization due to the negative voltage applied to the top gate electrode is prevented. See the disclosure in the specification at, for example, page 58, lines 6-20.

It is respectfully submitted that none of the cited prior art references disclose, teach or suggest the above described structural features and advantageous effect of the present invention as recited in amended independent claims 8 and 10.

In item 13 of the Office Action, the Examiner acknowledges that Hollis et al does not explicitly teach the layered gate electrode structure, the plural means for applying a voltage, or the transparent conductive layer of the present invention. For this reason, the Examiner has cited Iihama.

With respect to Iihama, the Examiner asserts that this reference discloses that a positive voltage is applied on the bottom gate electrode 22 thereof (see paragraph [0067] of Iihama.) However, the applied positive voltage to the bottom gate electrode 22 in Iihama is merely to form a channel in the semiconductive layer thereof. And, it is respectfully submitted that Iihama does not disclose, teach or suggest a transparent conductive layer to which a positive voltage is applied as according to the present invention as recited in claims 8 and 10.

As pointed out hereinabove, when a positive voltage is applied to the transparent conductive layer of the claimed present invention, an advantageous effect is produced whereby electrostatic repulsion of nucleotide strands leading to blocking out of hybridization due to the negative voltage applied to the top gate electrode is prevented. In order to produce this effect, as recited in the claims 8 and 10, the transparent conductive layer is positioned between the DNA probes and the photoelectric elements including the top gate electrode. With this structure, the effect of the negative voltage applied to the top gate electrode to the nucleotide strands is canceled out.

By contrast, the bottom gate electrode 22 of Iihama (to which a positive voltage is applied) is not positioned in a similar manner. And clearly, applying a positive voltage to the bottom gate electrode 22 of Iihama does not produce the advantageous effect achieved by the claimed present invention. Therefore, it is respectfully submitted that applying a positive voltage to the bottom gate electrode 22 in Iihama does not at all correspond to applying a positive voltage to the transparent conductive layer as according to the claimed present invention.

As pointed out hereinabove, the subject to be tested with the optical DNA sensor and DNA reading apparatus of the present invention is entirely different from that of the fingerprint reading apparatus of Iihama. And it is respectfully submitted

that the application of a positive voltage to the transparent conductive layer of the claimed present invention has a totally different effect than that of applying the positive voltage to the bottom gate electrode of Iihama. In addition, it is respectfully submitted that the structural arrangement of the transparent conductive layer of the claimed present invention is entirely different from the structural arrangement of the bottom gate electrode of Iihama.

Accordingly, even if the teachings of Iihama were combinable with Hollis et al in the manner suggested by the Examiner, it is respectfully submitted that such a combination would still not achieve or render obvious the claimed structural features and advantageous effect of the present invention as recited in amended independent claims 8 and 10 whereby the transparent conductive layer is provided in the solid imaging device between the DNA probes and the plurality of photoelectric elements, and to which a positive voltage is applied to attract a nucleotide strand.

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In view of the foregoing, it is respectfully submitted that the present invention as recited in each of amended independent claim 1, 5, 8 and 10, as well as each of claims 4, 11-13, 17-21

and 22-25 respectively depending therefrom, clearly patentably distinguishes over Hollis et al, Iihama, Garvison et al and Iwasa, taken singly or in combination consistent with the respective fair teachings thereof, under 35 USC 103.

Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

/Douglas Holtz/

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